# Reference Terminology for Therapeutic Goals: A New Approach

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*Participants at the Nursing Terminology Summit Conference 2002 developed proposed terminology models and information models for findings, goals, and outcomes and described the relationships among these concepts. At Vanderbilt University the author has dissected items in a controlled vocabulary of goals in accordance with the terminology model for findings. The concept-based dissections are linked to pre-coordinated phrases in a relational database, providing unambiguous definitions of clinical expressions and enabling concept-oriented searching of the terms database and of the goal achievement database.*

## INTRODUCTION

Occurring annually since 1999, the Nursing Terminology Summit Conferences at Vanderbilt University, Nashville, Tennessee, U.S.A., bring together experts in healthcare language and standards from diverse employment settings in the Americas, Europe, Asia, and Australia [1-3]. The Summit aims to promote and support the development, evaluation, and use of reference terminology for nursing and its integration into other terminological systems and applications in health care. Through work at the conferences and collaboration between meetings, Summit participants have contributed substantially to draft standards for nursing diagnoses and actions submitted to the International Standards Organization (ISO) by the Nursing Informatics Special Interest Group of the International Medical Informatics Association (IMIA) and the International Council of Nurses (ICN) [4]. Actions at the Summit have also led to integration of nursing vocabularies and concepts into standards such as Health Level 7 (HL7) and the Logical Observations, Indicators, Names, and Codes (LOINC), as well as to increased nursing leadership in these organizations.

At the 2002 Summit Conference, one group of participants turned their attention to the domains of Findings, Goals, and Outcomes, and to the relationships among them. They proposed that the most general of these is the Finding. Goals, Outcomes, and Findings are represented identically in the terminology model, which contains only *definitional* concepts and relationships. They are distinguished from one another in the information model, which contains non-definitional assertions as well as definitional concepts and relationships.

In the information model, a Goal's Timing (future) and its Mood (a desired but not yet real state) make it a special case of a Finding. Similarly, in the information model an Outcome's links to a baseline value and to an Intervention make it another special case of a Finding. These commonalities and differences are represented in Figure 1 [5].

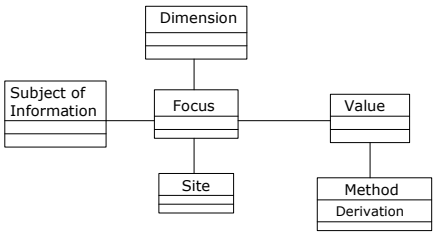
Findings, Outcomes, and Goals

| | | | |
|---|---|---|---|
| Findings (observation) | $O_{1A}$ | | $O_{2A}$ |
| Outcome | $O_{1A}$ | X | $O_{2A}$ |
| Goal | | X | $O_E$ |
| Goal Variance | | X | $O_E$-$O_{2A}$ |

O=observation, X=intervention, A=actual, E=expected

The terminology model of a Finding is shown in Figure 2.

Reference Terminology Model of Findings




Following the Terminology Summit Conference, this investigator tested the hypothesis that the

terminology model of the Finding would be adequate to represent definitional knowledge about therapeutic goals in a patient care management system.

## BACKGROUND

At Vanderbilt University Medical Center, clinicians use a software application called PathworX to manage patient care. Developed in-house, PathworX organizes care according to pathways that include the coordinated plans of care of all disciplines that participate in the care of the type of patient represented in each pathway. PathworX includes

- Truffle, a relational database of terms for care items and the conceptual definitions of those terms;
- A Template Pathway Builder used by designated personnel to create and update template pathways (using terms from Truffle); and
- A patient care function for
    - Assigning pathways,
    - Customizing pathways to individual patient needs (again using terms from Truffle),
    - Generating customized charting documents, and
    - Recording electronically whether and when therapeutic goals are achieved.

Tracking goal achievement plays an important role in quality improvement. Aggregating patient data by pathway, we can identify which goals, at which phase of the pathway, have less than optimal rates of achievement. In this way, the clinical teams identify opportunities for improvement. For example, when PathworX goal achievement data showed that only about 75% of patients with congestive heart failure were diuresing the target amount of 1 to 2 liters of urine output in the first 24 hours after admission, the clinical team identified the need to educate the General Medicine residents about the aggressive protocol used by the Cardiology team. Follow-up data collection and analysis after the educational intervention, currently underway, will show the effects on patient outcomes.

Using goal achievement data to assess and improve the quality of care—and to discover clinical knowledge about care effectiveness—requires that the goal statements have unambiguous definitions for both humans and computers. Using conceptual definitions would not only reduce ambiguity but also make it possible to search the terms database by concept to identify related goals. Consequently, in Fall 2002 this investigator undertook to represent for each goal statement in PathworX a conceptual definition consistent with the Findings model drafted at the 2002 Terminology Summit.

## METHODS

Although PathworX contains over 200 pathways, the team has standardized interface terms to the degree that 150 goal statements suffice to represent all of the goals in all of the pathways. These provided a workable sample to test the adequacy of the Findings model drafted at the 2002 Terminology Summit.

The investigator set up an Excel table with columns for the interface term and for the definitional concepts for a Finding as shown in the model. The initial column headers therefore were Item Name (the interface term), Focus, Site, Dimension, Value, Method, and Subject of Information. Working from an alphabetical list of interface terms, the investigator then recorded within the columns the concepts implicit in the interface expression. From this work emerged the need to expand the column-header categories from the model in two ways. First, to enable nurses to retrieve a set of related goals and to choose the most appropriate one for a template or customized pathway, the investigator created a nested classification system for Focus concepts. Second, to capture all of the information in the interface terms, additional column-header categories were created.

After the investigator had dissected the goal statements into the Excel table, the dissections were reviewed and validated by Janis Smith and SyLinda Littlejohn, nurses with major responsibility for building template pathways.

## RESULTS

The nested classification system for Focus is as follows:

- **Activity**
    - Exercises
    - Mobility
        - Transfers
    - Musculoskeletal Integrity
        - Conditioning
    - Tolerance
- **Cardiovascular Function**
    - Cardiac Rhythm

- Hemodynamics
  - Cardiac Indices
  - PA Pressure
- Tissue Perfusion

- **Comfort**
  - Nausea and Vomiting
  - Pain
    - Interventions
    - Relief
      - With Enteral Analgesics
      - With Parenteral Analgesics
  - Sleep and Rest
- **Coping**
  - Anxiety
    - Relief
  - Grief
  - Responsibility
  - Social Support
  - Strategies
- **Device**
  - Appliance
  - Drains
    - Patency
    - Function
  - Urostomy Pouch
- **Fluid and Electrolytes**
  - Electrolyte Balance
  - Fluid Balance
    - Urine Output
    - Weight
    - Weight Loss
- **Functional Status**
  - Activities
  - Self-Care
- **Gastrointestinal Function**
  - Abdomen
  - Flatus or Stool
  - Gastric Dumping
- **Infection**
  - Nosocomial
  - Tuberculosis
- **Integument**
  - Bleeding
  - Incision
  - Skin integrity
    - Edema
    - Erythema
  - Tissue Integrity
  - Wound
    - Drainage
- **Labs and Tests**
  - Blood Glucose
  - Blood Glucose with Insulin Infusion
  - Blood Glucose without Insulin Infusion
- **Liver Function**
- **Medication**
  - Adverse Reaction
  - Side Effects
- **Neurological Status**
  - Cognition
  - Level of Consciousness
- **Neurovascular Status**
- **Nutrition**
  - Diet
    - Consumption of Nutrients
    - Pre-procedure Diet
  - Status
  - Support
  - Weight
    - Weight Loss
- **Plan of Care**
  - Admission
    - Scheduling
  - Care after Discharge
    - Long-term Follow-up
      - Scheduling
    - Site Care
    - Teaching
  - Care Facility Orientation
  - Consent
    - Advance Directive
  - Diagnosis
    - Co-morbid Conditions
    - Etiology
  - Discharge
    - Discharge from Hospital
  - Finances
    - Insurance Pre-Certification
  - Labs and Tests
  - Location of Patient
    - Transfer
      - From ICU
  - Participation in Care
    - Rehab Program
  - Pathway
  - Perioperative Care
  - Procedure
    - Recovery
  - TNM Classification
  - Treatment Plan
  - Treatment Regimen
- **Respiration**
  - Airway
    - Clearance
    - Patency
      - Extubation
      - Suctioning
  - Breath Sounds
  - Breathing Pattern

- Respiratory Function
- Ventilator
  - Weaning

- **Safety**
  - Accidental Injury
    - Precautions
      - Adherence
  - Falls
    - Precautions
      - Adherence
  - Precautions
  - Protection
  - Restraints
    - Criteria for Release
- **Substance Use or Abuse**
  - Tobacco
    - Cessation
- **Urinary Function**
  - Bladder
    - Emptying
  - Kidney
    - Urine Output
- **Vital Signs**
  - Blood Pressure
    - Diastolic
    - Systolic
  - Heart Rate
  - Respiratory Rate
  - Temperature
    - Fever

The first additional column-header category required was "Judgment." Borrowed from the Nursing Diagnosis model, Judgment is an appropriate descriptor for concepts such as "Adequate," "Progressing," or "Improved," terms often included in goal statements. Other column-header categories come frankly from the information model rather than the terminology model, but are needed to capture information expressed in the goal statement. These categories are "Time Goal is Due" and "Contingencies." The former is self-explanatory. The latter refers to situations in which a goal is invoked, such as "If ventilated." Our template pathways sometimes include such goals for completeness; the nurse who customizes the pathway for an individual patient deletes those goals if the contingency does not apply.

The remaining categories from the Reference Terminology Model of Findings worked well to capture definitional concepts expressed in or implied by goal statements.

"Dimension of Focus" served well to differentiate goal statements that were about knowledge, performance abilities, or motivation. Recording this information in the formal definition makes it possible to search the terminology database and retrieve all statements pertaining to knowledge, or to performance abilities, or to motivation. Some examples are:

KNOWLEDGE: Pt/ Family/ SO verbalize understanding of pre-op teaching.

PERFORMANCE ABILITIES: Independent with exercises.

MOTIVATION: Adheres to precautions to prevent accidental injury.

Other goal statements are about "the thing itself" and do not have a value in the Dimension column. An example is "Recovers from procedure without complications."

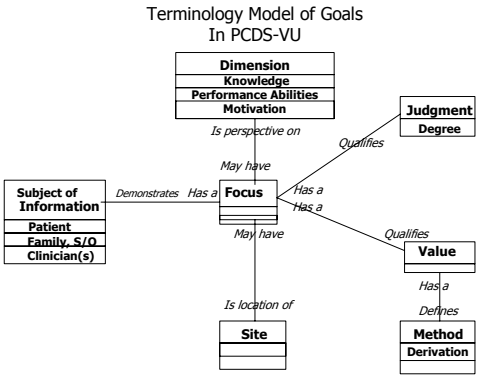
"Timing of Focus" was used only twice but was useful to specify "Pre-operative" in goals pertaining to preparation for surgery.

Because few of our goal statements specify a measured value (most rely on nursing judgment), the "Value" column has few entries. The goal "Weight loss achieved" has "Targeted Amount" in the "Value" column. The nurse customizing the pathway would specify the targeted amount for the individual patient.

The "Method of Measurement" is most often nurse observation and judgment. Sometimes, however, the method is specified in the goal statement, as in "PA pressure is stable via PA catheter."

In summary, the draft Reference Terminology Model of Findings developed at the 2002 Nursing Terminology Summit Conference was a useful way to represent conceptual definitions of the 150 goal statements used in the PathworX information system at Vanderbilt University Hospital. The model was modified by the addition of a category called "Judgment," defined just as it is in the ISO Reference Terminology Model of Nursing Diagnosis. In addition, to aid search and retrieval of related goals,

a nested hierarchy was created to classify goal statements by "Focus." The modified terminology model is shown in Figure 3.




## DISCUSSION

The creation of conceptual definitions for goal statements and their representation in a terms database, Truffle, enables our informatics tools to deliver important advantages to users.

First, we remove ambiguity from goal statements. For example, the goal "Weight loss achieved" might refer to loss of excess fluid or to loss of excess fat. The same interface expression appears under the "Fluid and Electrolytes" Focus and under the "Nutrition" Focus. It is the conceptual definition that differentiates therapeutic aims and guides the nurse who is selecting a term for a template or customized pathway. And because the goal has a unique "object identifier" number depending on the conceptual definition to which it is linked, the computer can also differentiate between the weight loss goal related to Nutrition and the one related to Fluid and Electrolytes.

This reduction in ambiguity itself enhances data mining for clinical research or quality improvement. By retrieving just exactly those goals that are pertinent to a query, we avoid confounding sources of variance.

Besides reducing ambiguity, the conceptual definitions of terms also help with data searches and retrievals. Nurses who are building template pathways or customizing pathways for individual patients can use the nested classifications under "Focus" to retrieve a set of related goal statements, then select the most appropriate from a conveniently small number of options. Nurses creating new interface terms for the Pathway Builder can readily find related terms and assure that they are not creating an unneeded synonym or duplicate term. And investigators can search goal achievement databases by concepts, not just by terms.

At Vanderbilt University Medical Center, then, a slight modification of the draft Reference Terminology Model of Findings developed at the 2002 Nursing Terminology Summit has guided the development of conceptual definitions of goal terms. Incorporating these conceptual definitions, along with the interface terms, into informatics tools has reduced ambiguity and enhanced capabilities for data searches and retrievals.

## REFERENCES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